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motor attached to the propeller-shaft. A case containing the high explosive is carried in a chamber in the forward end. This chamber slopes downward, so that the torpedo, which has a rocket attachment at its rear end, will be thrown down and out on being released. It is also proposed to invert the boat when occasion may require, and provide means for throwing the torpedo from this chamber into the air, so that it may fall on a vessel's deck.

The position of the opening to this torpedo-chamber may be seen in the illustration, as the small chain connecting with the harpoon in front is attached to the torpedo. When the harpoon strikes a wooden bottom, it is expected to penetrate deeply enough to hold. When it passes through a torpedo-net, the harpoon-head will pass through the meshes till the cross-arms are reached, when a spring catch is released allowing other cross-arms to open inside the net, and nearer the harpoon-head. In any event, the harpoon is held. At the same time the torpedo is released, the rocket chamber in its rear end is ignited, and the torpedo discharged downward. The chain attachment to the harpoon-head then compels a swinging motion, so as to bring the torpedo up against the vessel's bottom.

While all this is going on, the automatic arrangements have reversed the boat, and carried it away from its dangerous position, so that the operator may then guide it safely back for use in another attack.

AMERICAN PUBLIC HEALTH ASSOCIATION.

On the second day, Wednesday, Oct. 23, Dr. John S. Billings of the United States Army read a paper on "The United States Census in its Relation to Sanitation." He emphasized the importance of the collection of vital statistics. Many do not regard this as so important as other work in behalf of public health. In order to convince the press and the community that the work of a board of health is necessary, you must produce constant, undeniable evidence; and this evidence must be mainly death-rates, to which should be added all the sickness-rates obtainable. To do this there must be a complete registration of deaths and births, and an enumeration of the whole population. Before this association meets again, the eleventh United States census will have been taken, and its methods and results are of great interest to all sanitarians. One of the most important questions to be settled before the census is taken is, "What shall be the boundaries of the special districts of the city for which a separate statement of the population is desired?" In some cities the wards form fairly satisfactory districts for the purpose, and where this is the case it makes the problem very easy. But in many cities these divisions bear no proper relation to different sanitary conditions: therefore in about a dozen of our large cities it is proposed to make a systematic division of the area into sanitary districts having special relations to altitude, character of habitations or of population, etc., and to have special death-rates calculated for each of these districts. This is being done in conference with the health authorities of these cities, and it is hoped that in this way some very interesting data will be obtained which will serve as a foundation for sanitary work in the future.

To make the statistics as correct and useful as possible, all deaths occurring in hospitals should be charged to the ward or district of the city from which the patient was taken to hospital, when this can be ascertained; otherwise the death-rate in the ward in which the hospital is located will be too high, and in the other districts it will be too low. The birthplace of the parents of the decedent should be also reported. Moreover, it is very desirable that in all cases of deaths of colored persons it should be stated whether the decedent was black or of mixed blood, such as mulatto or quadroon. One of the most important questions in the vital and social statistics of this country relates to the fertility, longevity, and liability to certain diseases, of those partly of negro and partly of white blood; and the only way to obtain data on this subject is through the registration of vital statistics. For all cities of ten thousand inhabitants and upward, it is proposed to collect as complete information as possible with regard to altitude, climate, water-supply, density of population, sewerage, proportion of sewered and non-sewered areas, and other points bearing on the healthfulness

of the place which will permit of interesting comparisons with the death-rates. The cordial co-operation of all physicians and sanitarians is solicited in making the data of these reports accurate and complete. It is desired to make these vital statistics an unanswerable argument in favor of systematic public sanitary work and of the granting of State and municipal funds necessary for maintaining such work.

In a paper by Dr. Ezra M. Hunt, secretary of the State Board of Health, Trenton, N.J., on "The Prevention of Phthisis Pulmonalis, and Methods for its Limitation," the author criticised those who regard the infection of phthisis pulmonalis as exclusively due to inhalation of the dried sputa of this disease. The theory was advocated that the breath of a consumptive patient is capable of carrying the contagion.

Dr. W. M. Smith, quarantine officer of the port of New York, read a paper on "Improvements at the New York Quarantine Station."

An excursion to the Quarantine and East River Hospitals, accompanied by Dr. Smith, took up most of the day.

At an evening session, Dr. George M. Sternberg, U.S.A., gave an account of recent researches relating to the etiology of yellow-fever. The investigations were made in Havana, between the middle of March and the first of September, 1889. Ample material has been obtained for a thorough research by modern culture methods. Thirty autopsies have been made in typical cases of yellow-fever. The cultures obtained require further study and extended comparative research before any definite conclusion can be reached as to the specific etiological relation of one or other of the micro-organisms found in yellow-fever cadavers, principally in the intestine. One method followed in the entire series of cases was the preservation of a piece of liver or kidney in an antiseptic wrapping, by which the exterior was sterilized and the entrance of germs from without prevented. Such a piece, after forty-eight hours in the laboratory, appeared fresh, and had no odor, but when cut was found to contain various micro-organisms. The cut surface had an acid re-action. The bacilli were of various species, and corresponding with those found in the contents of the intestine. No satisfactory evidence has been obtained, up to the present time, that any one of these is the veritable yellow-fever germ. One of the most constantly found of these micro-organisms was a large motionless, anaerobic bacillus, resembling that of malignant œdema. This, and others found in a less number of cases, were present in small numbers at death, and in a large proportion of cases the result of an examination made immediately from fresh liver-tissue was negative. Material from a piece of liver, kept as above, and containing micro-organisms, is very pathogenic for guinea-pigs when injected subcutaneously in small quantities, while the fresh tissue may be injected in considerable amount without noticeable effect. The micrococcus of Freire has not been found in any cultures of this series, and the bacilli of Finlay and Gibier have not generally been found in the tissues of yellow-fever cadavers.

Dr. Theobald Smith of Washington read some preliminary observations on the micro-organism of Texas fever. Cultures have been made from the spleens of animals who died of Texas fever, and a variety of bacteria found. A variety of experiments led to the discovery of an organism within the red blood-corpuscles. The intraglobular bodies found are round or oval, and nearly colorless. There is usually one, but two or more may be found in one corpuscle.

This was followed by a paper by D. E. Salmon, D.V.M., chief of the Bureau of Animal Industry, Washington, entitled "Some General Observations on Texas Fever." The resemblance in the characteristics of yellow-fever in man and Texas fever in cattle was noticed. Each disease has a permanently infected and well-known district which is its home. The contagion of both diseases is carried, not by the sick, but by the healthy. Natives in the infected districts have a certain immunity from disease, while non-residents entering the locality will contract the fever. Both diseases, when carried north of their home, require a period of warm weather for development. Neither contagion survives a winter of snow and frost beyond its home. Both diseases are accompanied by an inflammation of the liver which causes yellow discoloration of the tissues, and in both hæmaturia is seen. These points of

similarity may indicate that the germs have a similar nature, but the facts are given as a coincidence.

Edward Atkinson, LL.D., of Boston, Mass., read a paper on "The Art of Cooking." A form of oven heated by an oil-lamp, with great saving of heat and fuel, was shown, and food prepared before the audience.

For the reports of this day we are indebted to *The Medical Record*.

The first paper on Thursday, Oct. 24, was by Health Commissioner Martin of Milwaukee, upon the disposal of garbage in that city. He considered various methods of getting rid of the refuse of cities. Many forms of crematories were in the market for burning garbage, but none worked with absolute satisfaction, and some were intolerable nuisances. Dr. Martin claimed that the cremation of garbage had had its day. He strongly favored the Merz system, which has been in use in Milwaukee since June last. From June 11 last, the quantity of garbage collected is forty tons daily, which, with that brought to the works by the commission dealers, wholesale men, and grocers, brings the total up to fifty tons, which is promptly disposed of. The works are situated in the slaughter-house district, and the building is a two-story frame, 62 by 110 feet. The garbage-teams drive up an inclined roadway to the second story, where the garbage is thrown on the floor to be scraped into the driers, of which there are eight. The time occupied in drying the garbage varies, of course, with the quantity and amount of moisture, but is usually from eight to eleven hours.

Dr. S. S. Kilvington, health commissioner of Minneapolis, presented a paper upon "Statistics on River-Pollution, with Observations Relating to the Destruction of Garbage and Refuse Matter." He said, that, out of thirty-five health officials he had communicated with, twenty-three favored the cremation system. He also said that in the Mississippi River, during the past year, eight cities alone deposited 152,675 tons of garbage and offal, 108,250 tons of night-soil, and 3,765 dead animals. In the Ohio River five cities in the same period dumped 46,700 tons of garbage, 21,157 tons of night-soil, and 5,100 dead animals. In the Missouri River, four cities cast 36,000 tons of garbage, 22,400 tons of night-soil, and 31,600 dead animals. No theory of self-purification of running water will dwarf the magnitude of this sanitary crime. The speaker doubted the practicability of using garbage as a fertilizer, because, while it contained fertilizing elements, they were not sufficiently concentrated for agricultural use. The trouble with the Merz system was, that it dealt only with garbage which had to be separated from other refuse. He urged the cremation of animal and household waste as far as possible in kitchen ranges and furnaces. Dr. Kilvington said that he had found no reason in the last year to change his belief that cremation, if not a perfect process, is at least the most desirable method for the disposal of the greater part of a city's refuse. After a few more speeches, Dr. Gibbon of the Marine Hospital offered a resolution providing that the committee on garbage be increased from eight members to nine, and be asked to report at the next convention as to the best method of handling refuse. This was adopted.

An important paper upon "Food in its Relation to Health" was presented by Professor W. O. Atwater. He spoke of the evils of over-eating, and gave tables of dietaries of various people, going to show that people in this country over-ate enormously, especially in the matter of meat and sweetmeats. Charts were shown on which the dietaries of people of various countries were displayed, compared with a standard dietary. The smallest dietary on which persons had lived for any great length of time was that of the Greeley party in the Arctic regions. The standard as estimated by German physiologists was exceeded by nearly all classes of workers in this country. Dr. Atwater compared the amount of food eaten by college professors, students, and families in New England, and gave many details of experiments. He said that the amount of food needed for intellectual exertion had not been estimated, and would require long and complex experiments, but it would be done some day. Much smaller quantities of food were needed than were actually used by many people in this country, with the result of undermining health to a great degree. The great cattle and pork business of the West, and the great corn-crop of this country, were responsible for the immense consumption of meat, and the

cheapness of sugar was responsible for the enormous consumption of sweetmeats.

In the discussion, Dr. Jerome Walker gave some facts from the experience in his own family. He claimed that meat once a day was enough for any ordinary person. The practice of children consuming large amounts of crackers was sharply condemned.

Edward Atkinson of Boston said he had carefully estimated the average size of the American man from facts obtained from dealers in ready-made clothing, and had found an increase. Mr. Atkinson said he had tried to reduce his waist without success, and by avoiding fat and sugar he had brought in seven devils worse than the first.

At the afternoon session the first paper was read by Dr. E. Plater of Ottawa, Can., on "The Prevention and Restriction of Tuberculosis in Man." He dwelt upon the importance of lung development as a means of prevention, and favored systematic exercises in the schools, calculated to produce such development.

Dr. P. H. Kretzschmar of Brooklyn read the next paper, on "The Prevention of Pulmonary Consumption." He said there was no such thing as consumption without bacilli. For that reason he had no doubt that the disease could be spread by contagion. Dr. Kretzschmar then went on to treat of the influence of heredity on pulmonary disease. He laid down the following propositions: First, If there are many children in a family, those born after the sixth or after the seventh are apt to develop pulmonary consumption; Second, If the children in a large family are born at short intervals, say, one year, the younger ones are apt to develop pulmonary consumption; Third, If the offspring of healthy parents, born under conditions named above, escape the disease, their children are apt to develop pulmonary consumption.

The doctor confessed that these views were novel, but said he believed that they were fully justified by his own experience and that of other physicians who had recorded their observations. Out of 556 cases which had been treated in Dr. Brohmer's sanitarium in Goerhersdorf, 4 were suffering from other diseases than consumption, 46 failed to give a satisfactory account of their family antecedents, 184 were offsprings of consumptive parents or grandparents; in 65 cases the disease came from the father, in 76 from the mother, in 14 cases from both sides, 16 times from the father's parents, 12 times from the mother's parents, and twice from the grandparents of both father and mother. Of the 322 remaining cases, 109 were from families with many children, and none of them were earlier born than sixth or seventh; 32 belonged to families where children had followed one another rapidly, mostly at intervals of one year; 147 were cases of acquired disposition. Of the 175 cases unaccounted for, 135 had parents who were born subject to conditions described in the doctor's first proposition.

In the discussion, Dr. Hibbard of Richmond, Va., dwelt chiefly on the necessity of easy-fitting clothing as a means of prevention. Then Dr. Plater took the floor in radical opposition to the whole theory of hereditary consumption. He was briefly answered by Dr. Kretzschmar.

Dr. Cyrus Edson of New York read a paper of great interest to medical men on the use of sulphur dioxide as a disinfectant. He had found this of great importance in tenement-house work against contagion in New York. This statement precipitated a discussion in the course of which the views of Dr. Edson as to the value of this agent were supported by Dr. Gray of Montreal, who told about its use in successfully stamping out a terrible epidemic in his city within six months. He said sulphur dioxide was of doubtful value only in the case of diphtheria.

Dr. Raymond of Brooklyn said the use of water with this agent was absolutely necessary. He asked whether the New York authorities had any record which would show the permanent effect of disinfection at any given time. Dr. Edson replied that the New York record showed every thing about the sanitary history of every house in the city where contagious diseases had occurred for three years back. Dr. Maxwell of Florida opposed Dr. Edson's conclusions, and insisted that it was doubtful whether sulphuric fumes were a safe disinfectant in any form. He backed up his position by reverting to the complete failure of this disinfectant in the yellow-fever epidemic at Tampa, Fla., Memphis, Tenn., and elsewhere in the South.

Many delegates took part in this debate. Dr. Edson said that the use of water with sulphur dioxide was a point on which he had not touched. Unhappy memories in his experience were connected with this practice. He tried it on 500 pairs of children's trousers. The water made a bleaching powder out of the disinfecting agent, and he had to pay damages on the trousers.

A general impression seemed to prevail, that, while sulphur was of use, it needed to be used with great care and thoroughness. Some delegates favored the substitution of chlorine. In answer to a question, Dr. Edson explained that in New York, when a room was to be disinfected, three pounds of sulphur were used for every thousand cubic feet of air. The sulphur was put on a dish in a tub of water, four ounces of alcohol to every three pounds were poured over it, and the alcohol was ignited.

Dr. John H. Roach of Chicago sent in the following preamble and resolution: "*Whereas* Asiatic cholera, leaving its usual restricted bounds, threatens to advance by the same lines that it has followed in the last four epidemics, be it resolved, that the American Public Health Association desires to call renewed attention to this fact, and to urge that quarantine authorities on the Atlantic and Pacific seaboards, and Boards of Health throughout the country, make every effort to prepare for this threatened danger." The resolution was at once referred to the executive committee.

In the evening a paper on "Sanitary Entombment," by the Rev. Charles R. Treat of this city, was the first. A carefully written paper on "Do the Sanitary Interests of the United States demand the Acquisition of Cuba?" was read by Dr. Benjamin Lee, secretary of the Pennsylvania State Board of Health. He summarized his conclusions as follows:—

"The exigencies of traffic and travel render rapid and constant communication between the United States and Havana a necessity. Havana is one of the most notorious breeding-places of yellow-fever, and is never free from its presence. The only means by which the germs of this disease can be eradicated are a proper system of sewerage and drainage, which shall deliver the filth of the city at a distant point into the waters of the ocean, and the removal of all the feculent soil. There is no hope that the Spanish Government will ever undertake a work of this magnitude for a dependency.

"The introduction of yellow-fever into the United States through both legitimate and illegal channels of trade must be of frequent occurrence so long as this condition of things continues. A single widespread epidemic of yellow-fever would cost the United States more in money—to say nothing of the grief and misery which it would entail—than the purchase money of Cuba.

"The precautions against the spread of small-pox in Cuba are entirely inadequate, and are rendered ineffective by reason of the superstition of a large proportion of the inhabitants: hence epidemics of that loathsome disease are of frequent occurrence.

"Leprosy prevails in Havana and the island of Cuba to a serious and constantly increasing extent. Leprosy is absolutely unrestricted in this island. While there is an immense and admirably administered leper-hospital in Havana, its inmates go and come among the residents of the city and country at will, until locomotion is rendered impossible by mutilation. The ravages of the disease are confined to no class or race. Leprosy has already obtained a foothold in the United States in the ports nearest to and in most constant communication with the island of Cuba. Leprosy has but one history, that of constant progression unless it is checked by isolation of the most absolute and unrelenting character. No centre of leprosy has ever originated in the United States. The importation of the first case of a series can always be distinctly traced."

A paper on "Railway Sanitation," by Dr. Samuel W. Latta, medical examiner for the Pennsylvania Railroad Voluntary Relief Department, was read, and, after some general discussion, the association adjourned till Friday.

On Friday the first paper read was by D. E. Salmon, D.V.M., chief of the Bureau of Animal Industry, Washington, D.C., upon "The Necessity for a More Rigorous Inspection of Meat-producing Animals at the Time of Slaughter."

Dr. Albert M. Gihon, U.S.N., read a paper on "The Causes of Infant Mortality," prepared by Dr. R. O. Beard, assistant commis-

sioner of health of Minneapolis. The various causes of the deaths of infants were carefully considered, being classified as arising from the bacillus tuberculosis and from nutritional and nervous disorders. For the first class the remedies were to be found in fresh air, disinfection, and the application of heat to all forms of infant food. The prevention of infantile disorders would be greatly promoted by the education of the people in sanitary matters. One of the great mistakes of the present day was to regard infants' stomachs as of a different character from those of adults. The writer said, "How long would the best of us of mature years withstand the terrors of marasmus if we should be confined in one or two close, stove-warmed or furnace heated rooms for an entire winter, without an excuse for ventilation or a sniff of outdoor air; if we were strangers, born and bred, to the taste of pure water or of any water; if we were compelled to be perpetually 'hungry' in order to get any thing to drink; if we revelled in ten or twelve square meals a day, and lunched at pleasure through the live-long night? And yet this is no parody upon the lives of infants in the majority of families in the humbler walks of life, and even among the educated classes. It devolves upon the medical profession, in the face of this prevailing ignorance, to educate the public in the principles of infant hygiene."

The paper further considered the various forms of food for children, and the writer said in conclusion, "The too frequent feeding of infants is a vice almost universally prevalent, and quite generally countenanced, or actually encouraged, by the profession. It is grounded in custom as absurd as the incasement of Chinese infants' feet in permanent baby-shoes. It is entrenched behind that most dangerous of all arguments—the argument from experience—among the ignorant, while it is condemned by every careful observation of the lower orders of animal life, and by every physiological principle bearing upon infancy."

Dr. G. C. Ashmun said that no class of the community needed instruction more in regard to this matter than the medical profession. While so much misinformation upon the subject existed, physicians needed carefully to consider the subject. Dr. Hibbard suggested that in the first twenty-four hours of the life of a child a foundation was laid for a life of health or disease. Health Officer Smith recommended more care in preparing death statistics, and that certificates setting forth debility, marasmus, or heart-failure as the causes of death be returned for correction. Dr. George H. Rohe suggested that all infants' food should be sterilized by boiling for ten or fifteen minutes. He wanted a fuller study of the causes of cholera-infantum. The outcome was the adoption of a motion by Dr. J. H. Raymond for a committee of five to consider the whole subject of mortality among infants, and to report at some future meeting.

Two papers by Edgar Richards, microscopist of the United States Treasury Department,—upon "American Methods of Manufacturing Oleomargarine" and "The Oleomargarine Law of the United States,"—were read by title. Charleston was selected as the place for the next meeting, and the date of meeting will be not earlier than Nov. 1, 1890. The following officers were elected: president, Dr. H. B. Baker of Lansing, Mich.; first vice-president, Dr. Frederic Montizambert of Quebec; second vice-president, Dr. Joseph H. Raymond of Brooklyn; secretary, Dr. Irving N. Watson of Concord, N.H.; treasurer, Dr. J. Berrian Lindsley of Nashville, Tenn.; executive committee, Drs. L. F. Solomon of Louisiana, William Bailey of Kentucky, H. B. Horlbeck of South Carolina, Walter Wyman of Washington, D.C., J. F. Kennedy of Iowa, Peter H. Bryce of Toronto, and the twelve ex-presidents of the association.

The total number of members who have attended the convention is 144. Resolutions of thanks were adopted for the hospitality of Brooklyn, with special thanks to Ex-Health Commissioner Raymond for his work in caring for the association.

ELECTRICAL NEWS.

A New Ammeter.

PROFESSOR H. J. RYAN of Cornell has invented an ammeter which *The Crank* states to be remarkable for its simplicity and accuracy, and describes as follows. It works on the same principle